

IN THE CLAIMS:

1. (PREVIOUSLY PRESENTED) A system of interactive evaluation of a geometric model comprising:

a computer system including a memory, a processor, a user input device, and a display device;

a computer generated geometric model stored in said memory of said computer system; and

a haptic interface operatively in communication with said computer system, wherein said haptic interface includes a haptic device for transmitting information between a user and the geometric model and wherein a haptic device position and orientation are acquired with respect to a surface of said geometric model and mapped into a geometric model coordinate reference system, a closest point position and orientation on the surface of said geometric model to the haptic device position is determined, a surface property of said geometric model at the closest point position and orientation is extracted, and a stick-to-surface force and a property-feedback force are determined and applied to said haptic device to constrain a motion of said haptic device to stick to a virtual surface representing the surface of said geometric model, thereby constraining a hand of a user to always be on the surface to enable the user to explore and feel the geometric model.

2. (ORIGINAL) A system as set forth in claim 1 including a virtual reality display mechanism operatively in communication with said computer system and said haptic interface, so the user can see the geometric model in a virtual environment.

3. (ORIGINAL) A system as set forth in claim 1 wherein said haptic interface tactilely conveys a surface property of the geometric model to a user through said haptic device and said haptic device is constrained to the surface of the geometric model

4. (PREVIOUSLY PRESENTED) A method of interactive evaluation of a geometric model, said method comprising the steps of:

acquiring a haptic device position and orientation with respect to a surface of the geometric model, wherein the haptic device is operatively connected to a haptic interface and the geometric model is stored in a memory of a computer system;

mapping the haptic device position and orientation into a geometric model coordinate reference system;

determining a closest point position and orientation on the surface of the geometric model to the haptic device position;

extracting a surface property at the closest point position and orientation;

determining a stick-to-surface force and a property feedback force using the surface property of the geometric model at the closet point position and orientation; and

applying the stick-to-surface force and property feedback force to the haptic device to constrain a motion of the haptic device to stick to a virtual surface representing the surface of the geometric model, thereby constraining a hand of a user to always be on the surface to enable the user to explore and feel the geometric model.

5. (ORIGINAL) A method as set forth in claim 4 including the step of selecting a geometric model from a database in the memory of the computer system prior to said step of acquiring the haptic device position and orientation, wherein the geometric model is a

computer-aided design model.

6. (ORIGINAL) A method as set for in claim 5 including the step of configuring the geometric model as a parametric surface, wherein a point representing the model has a set of coordinates within a predetermined coordinate system.

7. (ORIGINAL) A method as set forth in claim 6 including the step of orienting a haptic device position within a haptic device coordinate system.

8. (ORIGINAL) A method as set forth in claim 4 wherein said step of extracting a surface property includes the step of determining a surface normal at the closest point position and orientation.

9. (ORIGINAL) A method as set forth in claim 4 wherein said step of extracting a surface property includes the step of determining a surface curvature at the closest point position and orientation.

10. (ORIGINAL) A method as set forth in claim 4 including the step of mapping the surface property of the closest point position and orientation into a vector after said step of extracting a surface property.

11. (ORIGINAL) A method as set forth in claim 10 including the step of mapping the surface property of the closest point position and orientation into the haptic device coordinate reference system.

12. (ORIGINAL) A method as set forth in claim 4 wherein said step of applying a stick-to-surface force and a property feedback force includes the step of tactilely conveying a surface property of the geometric model to a user through the haptic device and constraining the haptic device to the surface of the geometric model.

13. (ORIGINAL) A method as set forth in claim 4 wherein the user views the surface of the geometric model using a virtual reality display mechanism in communication with the computer system and the haptic interface.

14. (ORIGINAL) A method as set forth in claim 13 wherein the computer system, haptic interface and virtual reality display mechanism are in communication with each other.

15. (PREVIOUSLY PRESENTED) A method of interactive evaluation of a geometric model, said method comprising the steps of:

selecting a geometric model from a database in the memory of a computer system;

acquiring a haptic device position and orientation with respect to a surface of the geometric model, wherein the haptic device is operatively connected to a haptic interface;

mapping the haptic device position and orientation into a geometric model coordinate reference system;

determining a closest point position and orientation on the surface of the geometric model to the haptic device position;

extracting a surface property at the closest point position and orientation;

mapping the surface property of the closest point position and orientation into a

vector;

mapping the surface property of the closest point position and orientation into the haptic device coordinate reference system;

determining a stick-to-surface force and a property feedback force using the surface property of the geometric model at the closet point position and orientation; and

adding the stick-to-surface force and property feedback force together to form an applied force and applying the applied force to the haptic device to constrain a motion of the haptic device to stick to a virtual surface representing the surface of the geometric model, thereby constraining a hand of a user to always be on the surface to enable the user to explore and feel the geometric model.

16. (ORIGINAL) A method as set forth in claim 15 including the step of configuring the geometric model as a parametric surface, wherein a point representing the model has a set of coordinates within a predetermined coordinate system.

17. (ORIGINAL) A method as set forth in claim 16 including the step of orienting a haptic device position within a haptic device coordinate system.

18. (ORIGINAL) A method as set forth in claim 15 wherein said step of extracting a surface property includes the step of determining a surface normal at the closest point position and orientation.

19. (ORIGINAL) A method as set forth in claim 15 wherein said step of extracting a surface property includes the step of determining a surface curvature at the closest

point position and orientation.

20. (ORIGINAL) A method as set forth in claim 15 wherein the user views the surface of the geometric model using a virtual reality display mechanism in communication with the computer system and the haptic interface.